

### **REMARKS**

Claims 1-11 and 19-24 are now pending in the application. Minor amendments have been made to the specification to simply overcome the objections to the specification under 35 U.S.C. § 112. Claims 1, 3, 6, and 7 have been amended and Claims 12-18 have been cancelled herein. New Claims 19-24 have been added and recite novel limitations of the present disclosure as described in more detail below. No new matter has been added. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

### **ELECTION/RESTRICTIONS**

The Examiner has required restriction under 35 U.S.C. § 121 to one of the following inventions:

- I. Claims 1-11, drawn to a method for forming a metallic composite structure, classified in class 29, subclass 469.5;
- II. Claims 12-18, drawn to a composite structure, classified in class 428, subclass 613.

Applicants affirm the provisional election made on 11/03/05 and respectfully request the Examiner to proceed with Group I identified in Claims 1-11 and cancel Claims 12-18.

### **SPECIFICATION**

The specification stands objected to for certain informalities. Applicants have amended the specification according to the Examiner's suggestions. Therefore, reconsideration and withdrawal of this objection are respectfully requested.

### **REJECTION UNDER 35 U.S.C. § 103**

Claims 1-3, 5-9 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schwartz et al. (U.S. Pat. No. 6,085,965) in view of Saunders et al. (U.S. Pat. No. 5,974,847). This rejection is respectfully traversed.

Schwartz teaches a method of forming low density core metal parts by pressure bonding face sheets to a porous foam metal core and simultaneously densifying the core.

Applicants respectfully maintain that the Examiner has mischaracterized the Schwartz patent as teaching a blow molding process as opposed to a vacuum molding pressure bonding process. Contrast to the teachings of the present disclosure, the Schwartz patent discloses flushing a forming die with an inert gas and evacuating the die to a vacuum having a pressure less than  $10^{-6}$  torr (as stated in column 6, lines 44-51). The present disclosure and amended claims provide and recite superplastically blow forming a composite sandwich by use of a positive differential gas pressure. While superplastic forming is briefly mentioned in the background of the Schwartz patent to disclose *other* forming technologies, the disclosure does not further teach or disclose the use of the superplastic forming of a sandwich structure as the Office Action contends. The mere recitation of a metal itself, although it *can* be superplastically

formed (e.g., aluminum), does not teach the concept or use of superplastic forming. The legal requisite that there be a suggestion, motivation, or teaching to those skilled in the art for such a combination with the use of this reference is completely lacking.

The Schwartz reference further teaches that the metal face sheets are *preformed* and correspond generally in shape to the LDC part to be manufactured therefrom. See column 4, lines 15-17. Claim 1 further recites that that face sheets have a particular shape, and that at least one of the face sheets is non-planar. The present invention uses *undeformed* sheet metal. See paragraphs 20 and 28. The Schwartz reference also appears to teach away from the present invention by teaching the pressure bonding of the face sheets to the metal core expressly *without* the addition of soldering or brazing composition, stating that brazing does not form a direct bond and that parts formed by brazing are subject to delamination and have a low degree of structural stability. See column 2 lines 42-46, and column 4, lines 58-62. Still further, the Schwartz reference teaches *densifying the core* to correspond generally to the shape of the face sheets by applying uniaxial forge pressure. This teaches away from the present invention wherein the sheet metal is heated without pressure in order to *reduce the density* of the foam core. Claim 1 has been amended to recite this limitation, which is also present in new claim 19.

The Saunders et al. patent discloses a method for superplastically stretching metal sheet blanks. While Saunders discloses a similar die and platen configured to sealingly engage a periphery of the sheet metal, it does not teach, disclose, or suggest the forming of a metallic composite structure comprising a metallic foam substrate sandwiched between metal sheets. Referring to Figure 2B, since Saunders teaches a

preform 60 positioned directly adjacent die element 50, it would appear that there would not even be space in this construction for the placement of a metallic foam substrate. Still further, there is no motivation for one skilled in the art to use foamed metallic substrates in a superplastic or quickplastic process.

In regards to claim 2, the Office Action proposes that it would have been obvious to couple the metallic foam substrate to the sheet metal prior to applying gas pressure to form the sheet metal, since Applicants have not disclosed that coupling the metallic foam substrate prior to applying gas pressure “solves any stated problem” or is for “any particular purpose.” It is believed that failure to solve a stated problem is no basis for supporting a prima facie case of obviousness. Rather, an examiner judge obviousness from the vantage point of the prior art. It is well-settled law that a proposed modification of the prior art must be supported by motivation to make the modification, and that motivation must also come from the prior art. *In re Kotzab*, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000) (being guided only by the prior art references in determining obviousness “is especially important in cases where the very ease with which the invention can be understood may prompt one ‘to fall victim to the insidious effect of a hindsight syndrome’”). The cited prior art does not teach nor does it suggest coupling a metallic foam substrate to the sheet metal prior to applying gas pressure. The Applicants need not show that the invention solved a particular problem or performed better than what the prior art discloses.

In regards to claim 11, the Office Action proposes that it would have been obvious to reinforce high purity aluminum with a low volume fraction of ceramic particles on the basis of an intended use and basic design choice. The Examiner seeks to

invoke the patent law axiom that the mere substitution of some new material for that formerly used does not necessarily rise to the dignity of patentable invention, even though it results in a superior article. But here much more than substitution is involved. Superplastic forming is a fabrication technique that relies on superplasticity—wherein under certain conditions, some materials can be plastically deformed without rupture well beyond their normal limits. This property is exhibited by certain metals and alloys within limited ranges of temperature and strain rate that is within a superplasticity range at an elevated temperature. Unlike *In re Leshin*, where the art suggested the interchangeability of plastics for a container-dispenser, the selection of a metallic foam substrate material suitable for being sandwiched between metal alloy sheets and superplastically deformed within a die mold at specific temperatures and pressures is not a basic task, especially with the new method disclosed in the teachings of the present invention. See also *Continental Can Company, Inc. v. Anchor Hocking Glass Corporation*, 150 USPQ 1 (CA 7 1966).

Claims 1-4 and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niebylski (U.S. Pat. No. 3,834,881) in view of Saunders et al. (U.S. Pat. No. 5,974,847).

Niebylski teaches a laminated structure of foamed metal layers with a load distributing sheet material interposed between the foamed metal to prevent catastrophic shear. The sheet material can be metal, plastic, high strength paper, or any material which acts to distribute force, preferably aluminum. See the abstract and column 1, lines 59-61. The Examiner states that Niebylski discloses the use of superplastically

formable alloys for use as sheet metal and metal foam. Applicants respectfully disagree as there is no such teaching in this reference to support such a hypothesis. The Niebylski patent is wholly silent in regards to the concept and does not mention or describe superplasticity anywhere, and does not even contain the term. The Niebylski patent mentions layering metal foam with aluminum sheets, but not in the context of superplastically forming a composite material, and further does not provide any useful information to one skilled of ordinary skill in the art who wished to do so. Therefore, reconsideration and withdrawal of these rejections are respectfully requested.

#### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner

believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: February 15, 2006

By: 

Christopher A. Eusebi  
Reg. No. 44,672

CORRESPONDENCE ADDRESS:

Kathryn A. Marra  
General Motors Corporation  
Legal Staff - Mail Code 482-C23-B21  
PO Box 300 - 300 Renaissance Center  
Detroit, Michigan 48265-3000  
Ph: 313-665-4708  
Fax: 313-665-4976

CAE/AEP/rc